1. A computer implemented method of determining a motion vector for encoding a block of a predicted frame with respect to a reference frame, the method comprising:

determining a number of phase correlation peaks between a phase correlation block of the predicted frame and a corresponding phase correlation block of the reference frame, the phase correlation block of the predicted frame including the block;

determining for each phase correlation peak, a motion vector; and

selecting from the motion vectors, a motion vector that minimizes a distortion measure between the block and a reference block offset from the block by the motion vector.

2. The computer implemented method of claim 1, wherein determining at least one phase correlation peak, comprises:

applying a Fourier transform to a phase correlation block of predicted frame and a corresponding phase correlation block of the reference frame;

determining a normalized cross product of the Fourier transforms;

determining an inverse Fourier transform to obtain a phase correlation surface; and

determining at least one peak on phase correlation surface;

3. The computer implemented method of claim 1, wherein determining at least one phase correlation peak, comprises:

determining for each peak a motion vector;

selecting from the determined motion vectors, a motion vector that minimizes a distortion measure between the block and a block of the reference frame offset from the block by the motion vector.

4. The computer implemented method of claim 1, wherein selecting a motion vector, comprises:

applying each of the motion vectors to the block to obtain the reference block in the reference frame;

selecting the motion vector that minimizes a distortion measure between the block and the reference block.

5. The computer implemented method of claim 1, wherein each phase correlation block has horizontal and vertical dimensions that are a function of a maximum magnitude of the motion vectors.

6. The computer implemented method of claim 5, wherein the horizontal and vertical dimensions M and N, are each a power of 2 greater than 2S+16, where S is the maximum magnitude of the motion vectors.

7. The computer implemented method of claim 1, further comprising:

applying to the phase correlation block of the predicted frame a windowing function prior to determining the at least one phase correlation peak.

8. The computer implemented method of claim 7, wherein the windowing function reduces discontinuity between adjacent phase correlation blocks.

9. The computer implemented method of claim 7, wherein the windowing function is a smoothing function at the edges of the phase correlation block.

10. The computer implemented method of claim 7, wherein the windowing function is an extended 2D cosine bell function.

11. The computer implemented method of claim 10, wherein the windowing function is:

$$W(m,n)=\begin{cases}\frac{1}{2}\left[1-\cos\left(\frac{16*m*\Pi}{M}\right)\right]*\frac{1}{2}\left[1-\cos\left(\frac{16*n*\Pi}{N}\right)\right]\ldots for\left(\frac{M}{16}\le m\ldots or\ldots m\ge\frac{15*M}{16}\right)and\left(\frac{N}{16}\le n\ldots or\ldots n\ge\frac{15*N}{16}\right)\\ 1\ldots otherwise\end{cases}$$

where M is a width of a phase correlation block and N is a height of a phase correlation block.

12. The computer implemented method of claim 1, wherein phase correlation blocks of the predicted frame are non-overlapping.

13. The computer implemented method of claim 1, wherein phase correlation blocks of the predicted frame are overlapping.

14. The computer implemented method of claim 13, wherein the phase correlation blocks overlap by a minimum overlap value, where the minimum overlap value is greater than or equal to a maximum magnitude of the motion vectors.

15. The computer implemented method of claim 13, wherein selecting from the motion vectors comprises selecting from the motion vectors associated with all phase correlation blocks that include the block.

16. The computer implemented method of claim 1, wherein determining a number of phase correlation peaks comprises:

determining a fixed number of correlation peaks.

17. The computer implemented method of claim 1, wherein determining a number of phase correlation peaks comprises:

determining a variable number of correlation peaks.

18. The computer implemented method of claim 1, wherein determining a number of phase correlation peaks comprises:

determining a number of correlation peaks as a function of a size of the block.

19. The computer implemented method of claim 1, wherein determining at least one phase correlation peak comprises:

determining a number of correlation peaks as a function of a variance of the values of the phase correlation peaks.

20. The computer implemented method of claim 1, wherein determining at least one phase correlation peak comprises interpolating subpixel peak values from the phase correlation peaks at pixel locations in the phase correlation block.

21. The computer implemented method of claim 1, wherein selecting a motion vector comprises:

determining a plurality of subpixel motion vectors near the selected motion vector; and

selecting one of the plurality of subpixel motion vectors.

22. The computer implemented method of claim 1, wherein selecting a motion vector comprises:

selecting a first motion vector which reduces the distortion measure below a threshold value.

23. The computer implemented method of claim 22, wherein the threshold is a fixed distortion threshold.

24. The computer implemented method of claim 22, wherein the threshold is an adaptive distortion threshold.

25. The computer implemented method of claim 24, wherein the adaptive distortion threshold is a minimum distortion measure of a plurality of neighboring blocks.

26. A method of determining motion vectors for encoding a predicted frame with respect to a reference frame, the method comprising:

determining a phase correlation between the predicted frame and the reference frame, wherein the phase correlation produces a phase correlation surface including a number of phase correlation peaks; and

determining the motion vectors for encoding the predicted frame from motion vectors defined by locations of the phase correlation peaks on the phase correlation surface.

27. A computer implemented method of determining motion vectors for encoding blocks of a predicted frame with respect to a reference frame, the method comprising:

dividing the predicted frame and the reference frame into a plurality of phase correlation blocks, each phase correlation block including a number of blocks;

for each phase correlation block in the predicted frame, determining a number of phase correlation peaks between the phase correlation block and a corresponding phase correlation block of the reference frame, and for each phase correlation peak, determining an associated motion vector; and

for each phase correlation block in the predicted frame, and for each block to be predicted in the phase correlation block, selecting from the motion vectors associated with the phase correlation block, a motion vector that minimizes a distortion measure between the block and a reference block in the reference frame offset from the block by the motion vector.

28. An apparatus for determining a motion vector for encoding a block, the video frames including a predicted frame and a reference frame, the apparatus comprising:

a motion estimator circuit adapted to determine a number of phase correlation peaks between a phase correlation block of the predicted frame and a corresponding phase correlation block of the reference frame, the phase correlation block of the predicted frame including the block, determine a motion vector for each phase correlation peak, and select from the motion vectors, a motion vector that minimizes a distortion measure between the block and a reference block offset from the block by the motion vector.

29. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to apply a Fourier transform to a phase correlation block of predicted frame and a corresponding phase correlation block of the reference frame, determine a normalized cross product of the Fourier transforms, and apply an inverse Fourier transform circuit to obtain the phase correlation surface.

30. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine for each peak a motion vector, and select from the determined motion vectors, a motion vector that minimizes a distortion measure between the block and a block of the reference frame offset from the block by the motion vector.

31. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to apply each of the motion vectors to the block to obtain the reference block in

the reference frame, and select the motion vector that minimizes a distortion measure between the block and the reference block.

32. The apparatus of claim 28, wherein each phase correlation block has horizontal and vertical dimensions that are a function of a maximum magnitude of the motion vectors.

33. The apparatus of claim 32, wherein the horizontal and vertical dimensions M and N, are each a power of 2 greater than 2S+16, where S is the maximum magnitude of the motion vectors.

34. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to apply to the phase correlation block of the predicted frame a windowing function prior to determining the phase correlation peaks.

35. The apparatus of claim 34, wherein the windowing function reduces discontinuity between adjacent phase correlation blocks.

36. The apparatus of claim 34, wherein the windowing function is a smoothing function at the edges of the phase correlation block.

37. The apparatus of claim 34, wherein the windowing function is an extended 2D cosine bell function.

38. The apparatus of claim 34, wherein the windowing function is:

$$W(m,n) = \begin{cases} \frac{1}{2}\left[1-\cos\left(\frac{16*m*\Pi}{M}\right)\right]*\frac{1}{2}\left[1-\cos\left(\frac{16*n*\Pi}{N}\right)\right]\ldots for\left(\frac{M}{16}\leq m\ldots or\ldots m\geq\frac{15*M}{16}\right) and \left(\frac{N}{16}\leq n\ldots or\ldots n\geq\frac{15*N}{16}\right) \\ 1\ldots otherwise \end{cases}$$

where M is a width of a phase correlation block and N is a height of a phase correlation block.

39. The apparatus of claim 28, wherein phase correlation blocks of the predicted frame are non-overlapping.

40. The apparatus of claim 28, wherein phase correlation blocks of the predicted frame are overlapping.

41. The apparatus of claim 28, wherein the phase correlation blocks overlap by a minimum overlap value, where the minimum overlap value is greater than or equal to a maximum magnitude of the motion vectors.

42. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to select a motion vector from the motion vectors associated with all phase correlation blocks that include the block.

43. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine a fixed number of correlation peaks.

44. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine a variable number of correlation peaks.

45. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine a number of correlation peaks as a function of a size of the block.

46. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine a number of correlation peaks as a function of a variance of the values of the phase correlation peaks.

47. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to interpolate subpixel peak values from the phase correlation peaks at pixel locations in the phase correlation block.

48. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to determine a plurality of subpixel motion vectors near the selected motion vector, and select one of the plurality of subpixel motion vectors.

49. The apparatus of claim 28, wherein the motion estimator circuit is further adapted to select a first motion vector which reduces the distortion measure below a threshold value.

50. The apparatus of claim 49, wherein the threshold is a fixed distortion threshold.

51. The apparatus of claim 49, wherein the threshold is an adaptive distortion threshold.

52. The apparatus of claim 51, wherein the adaptive distortion threshold is a minimum distortion measure of a plurality of neighboring blocks.

53. An apparatus for determining a motion vector for encoding a block, the video frames including a predicted frame and a reference frame, the apparatus comprising:

circuit means for determining a number of phase correlation peaks between a phase correlation block of the predicted frame and a corresponding phase correlation block of the reference frame, the phase correlation block of the predicted frame including the block, determining a motion vector for each phase correlation peak, and selecting from the motion vectors, a motion vector that minimizes a distortion measure between the block and a reference block offset from the block by the motion vector.

54. A computer program product, comprising a computer readable medium storing computer executable instructions, the instructions adapted to control a processor to perform the method of any one of claims 1, 26, or 27.

55. A hybrid video compression apparatus that compresses video frames using block-based temporal prediction of motion between frames, and transform coding of prediction information, where motion between frames is represented as motion vectors, characterized in that the motion vectors are identified by determining a phase correlation between different frames, and selecting the motion vectors for predicting the motion from motion vectors associated with phase correlation peaks.